

ASPECT RATIOS OF SMALL VOLCANIC EDIFICES ON VENUS. Tracy Laxson and Mike Ellison, Evergreen Senior High School, 14300 NE 18th St., Vancouver, WA 98684. e-mail: tlaxson@egreen.wednet.edu; mellison@groupwise.egreen.wednet.edu. Goro Komatsu, Lunar and Planetary Lab, University of Arizona, Tucson, AZ 85721

Introduction: Based on a database of over 2,000 small volcanoes, it is estimated there are approximately 500,000 identifiable small volcanic edifices on Venus [1]. Of those, 58% are classified as shield-shaped, 20% are conical-shaped, and 20% are domical-shaped [1]. The size frequency distribution of small edifices is comparable to a sample of 51 terrestrial seamounts along the Izu-Bonin Arc in the Northern Philippine-Sea Plate [5]. The average height-to-diameter ratio of typical submarine volcanoes is similar to that of Venusian volcanoes [5]. A majority of small volcanoes occur between 6051.5 and 6053 km planetary radius [3]. A sample of over 3800 small edifices showed a mean diameter of 2.57 km [3]. Forty-one percent showed diameters of 2-3.5 km [1]. The same is true of a sample of 200 terrestrial submarine volcanoes on the East-Pacific Rise[4].

Except for one cone-shaped volcano, this study measured shields designated S2 by Guest [5]. They are roughly circular with low inclination aprons, steep margins and a flat-top. This study didn't measure other types of shields with less topographic relief and which are more irregular in shape. This study analyzed the basal diameter, height, and height-to-diameter ratio of 5 small Venusian volcanoes (<20 km diameter). The edifices studied include four shield-shaped and one conical-shaped. All are located between 49°S and 50°S latitude and 345°E and 360°E longitude. The range of diameters in our study was 4-9 km. The average diameter was 5.8 km.

Methods: Using Image 1.49 PDS on a Macintosh computer, the volcanoes were located by centering the cursor over the central pit of the edifice and recording the latitude and longitude. Diameters were measured by averaging the East-West and North-South distances in kilometers. Guest's classification scheme was used [5]. The parallax method was used to calculate height [6]. A reference point on the plain directly east or west of the summit was chosen, and the distance from the reference point to the nearest edge of the edifice was measured and recorded. The Magellan HyperMap was used to determine the incidence angles. The incidence angles used were interpolated between those at the top and bottom of the MIDR.

Discussion: The height of the five edifices measured is plotted against the respective diameters in Figure 1. The average height-to-diameter ratio for small volcanic edifices in this study is 0.26 ± 0.25 . This places these edifices within the same height and basal diameter range as Icelandic-type shields on Earth. The height-to-diameter ratio is affected by the comparatively large ratio of the conical-shaped edifice. The mean height-to-diameter ratio of small Venusian edifices is higher than some studies but is within the range of terrestrial seamounts [5]. The average slope of the shield-shaped edifices in the study was 0.5. The height-to-diameter ratio for shields in this study is less than the ratio of the cone-shaped edifice. The mean ratio for shield-shaped edifices was 0.17 ± 0.15 . The small edifices showed a larger average diameter than the mean diameter of terrestrial seamounts on the East-Pacific Rise. The basal diameter range is consistent with other regions on Venus [1].

This sample was very small. Many small shields on Venus are defined only by a central pit and variation in radar backscatter. Their irregular shape and edges often blend in with the surrounding plains to make measurement of their diameter and height problematic. They are inferred to have extremely low topographic slopes. Including these types of edifices in the sample would reduce the average height-to-diameter ratio, perhaps significantly.

This study further confirms the geomorphic similarity of terrestrial submarine volcanoes and small Venusian volcanoes found in the plains of each planet. This similarity may indicate that the processes controlling formation of these volcanoes, including the size of magma chamber, duration of eruption and magma composition, may also be similar.

REFERENCES: [1] Sahuaro High School Res. Class (1994) LPSC XXV, 1187-1188. [2] Komatsu, G. et al., (1996) LPSC XXVII, 687-688. [3] Gerlach, K. and Fosse, A., (1994) unpub. data. [4] Searle, R. C., (1983) *Marine Geology*, **53**, 77-102. [5] Guest, J. et al., (1992) *J. Geophys. Res.*, **97**, 15949-15966. [6] Plaut, J. (1993) *Guide to Magellan Image Interpretation*, JPL, 34-35.

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Class*	Latitude (°S)	Longitude (°E)	F-MIDR		Diamete r (km)	Height (km)	Height-to- diameter ratio	Slope
			Right Look	Left Look				
C	50.3	359.02	50S356;201	50S356;1	4.1	2.7	0.65	1.3
S2	49.6	346.51	50S348;201	50S345;1	4.6	0.80	0.17	0.35
S2	49.33	346.81	50S348;201	50S345;1	5.5	0.21	0.04	0.08
S2	49.36	346.46	50S348;201	50S345;1	5.9	2.2	0.38	0.75
S2	50.62	346.37	50S348;201	50S345;1	8.7	0.67	0.08	0.15

* Edifice classification used in this study from Guest, et al., 1992

Average of all0.26

Standard Deviation0.25

Average of shields0.17

Standard Deviation0.15

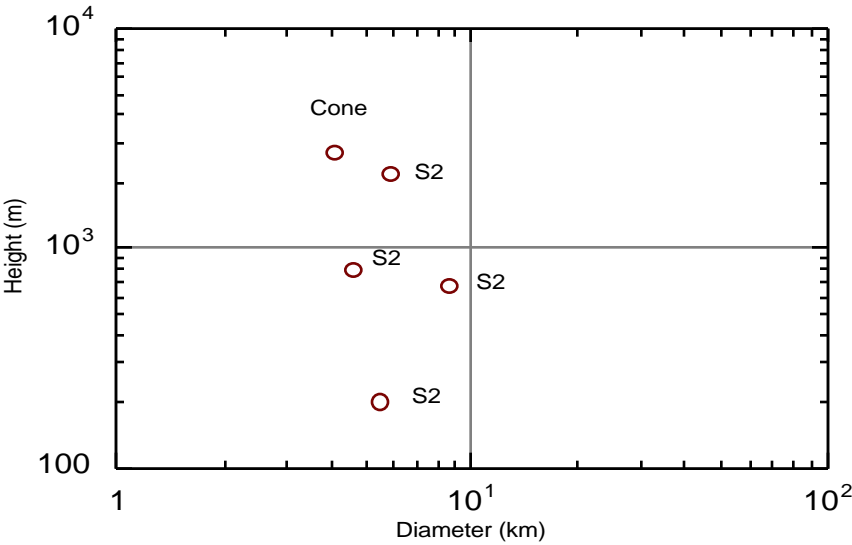


Figure 1- Diameter vs. height for small Venusian volcanic edifices in this study. Labels indicate class of edifice.